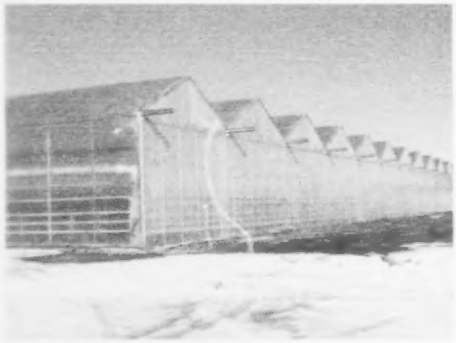
Alberta Greenhouse Industry Profile 2004



The size of the Alberta greenhouse industry is estimated at 12.40 million square feet (1.15 million sq.m), (approximately 285 acres,115 ha) distributed among approximately 400 growers. Major crops grown are vegetables, bedding plants, cut flowers, potted ornamentals, foliage plants and tree seedlings. The value of the industry is estimated to be about CDN $130 million with an investment of $250.00 million. Forty two percent of the greenhouses are under 10,000 sq.feet while 18% are over 40,000 sq.feet. The industry employs 1,400 full time and 3,000 part time people. Medicine Hat and Edmonton are the two cities with the largest concentration of greenhouses. Fifty two percent of greenhouses are seasonal and they include primarily bedding plants while 48% are year round operations which include mostly vegetables. Eighty eight percent of greenhouses use forced air furnaces as their heating systems, 31% have hot water and 15% have steam heating systems. Only three percent of all greenhouses are using coal at this time. The interest in co-generation systems has increased considerably due to an increase in the price of natural gas and it is likely that a few greenhouses will use energy form such facilities during the next few years. During 2002-2003 season two grower installed microtrubines to generate electricity, while another grower installed an underground heat storage and extraction system to heat the greenhouse.

Vegetables:

There are 60 acres of greenhouse space devoted to the production of seedless cucumbers, 25 acres to tomatoes, 10 acres to peppers and 2.5 acres to lettuce. This distribution of space is unique when compared to the greenhouse industries in Ontario, British Columbia and Quebec where a higher proportion of space is devoted to the production of tomatoes and less for cucumbers. Over the last 10 years, the average size of a vegetable greenhouse operation has increased to one acre. One acre is considered to be an economic unit for vegetable production.

The strong growth in vegetable production can be attributed to two packing facilities. The Red Hat Co-op is located in Redcliff (southern Alberta and has a membership of about 60 growers. The acreage devoted to the production of the three major crop changes every year based on the success of each grower. In 1999, the Red Hat Co-op upgraded and expanded their cucumber, tomato and pepper packing facility. They now have one of the most automated packing machines located in a 56,000 sq. feet building. The Pik-N-Pak Produce Ltd. is located around the village of Gull

Lake which is 10 kilometers west of the town of Lacombe in central Alberta. It has a membership of six growers. There are many smaller grower in rural areas who market directly to local stores and farmers markets. Sales through farmers markets are popular and generate more profit for the growers. Direct sales to restaurants also takes place for specialized vegetables of high quality like heritage tomatoes, fresh green beans and leafy baby vegetables. There is no marketing board for greenhouse vegetables and there is no quota system in place. Federal grade standards have to be followed for vegetables.

Seedless Cucumbers: Cucumbers are grown at a density of 1.25 to 1.50 plans/sq.m and the yields are reported in cucumbers/m2. Average yields in 2002 were around 110 cucumber/m2 while some growers reported yields as high as 130/m2. The potential yields could be as high as 150 cucumbers/m2 with the world highest yields reported to be close to 200 cucumbers/m2. Cucumber producers can grow , two or three crops per year because it is a relatively fast growing crop. Growers in southern Alberta tend to have a two crop system while growers in the central region prefer three crops per year.

With the two crop system, cucumbers are seeded in the middle of November and harvest begins in early February. Cloudy periods in late January can delay the harvest by one to two weeks. A second crop is seeded in June, planted in July with harvest beginning in early August. This crop continues until late November or early December.

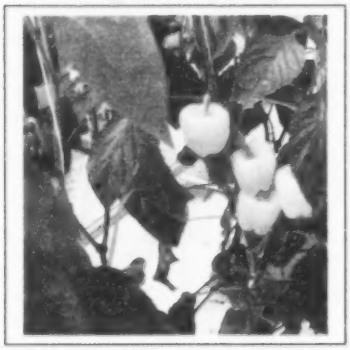
In a three crop system, the spring crop is terminated in late May and a second crop is planted by the end of May or early June. Harvest continues until the middle of August. The third crop is planted by late August and harvest continues until late November or early December. A three crop system generally produces better quality fruit although the production costs are higher.

Spruce sawdust was the most commonly used growing medium till 2002 but because of quality and availability problems, most of the growers have switched over to COIR which is coconut fiber coming from Siri Lanka with some growers also using yellow cedar sawdust from BC and rockwool. The cost of COIR will be a around $ 5,000/acre to set up.

Cucumber seedlings are generally brought in from BC at 3 weeks stage at a price of around $1.75/seedling. There is an opportunity to grow these seedlings locally. At an estimate of 56 acres of cucumbers with 4,000 seedlings per acre, that is $ 392,000.00

Tomatoes: Tomato crops are seeded in the middle of November and planted by early January. Many growers bring in 35 days old seedlings from BC. The planting density is around 2.5 plants/m2 and then in late March or early April every 4th plant is twin headed and that brings the plant density close to 3.2 plants/m2. For summer climate an additional side shoots can also be allowed to develop which means more labor will be required to manage the crop. The harvest begins about 110 days from seeding and continues until late November. The total marketable yields range between 50 to 60 kg/m2 with a potential of up to 70 kg/m2. From a cash flow point this means that there is no income for 100 days. Only one crop is produced in a year. Recently there is considerable interest in the production of cluster tomatoes. Unlike the beefsteak type of tomato which is harvested as individual fruits, cluster tomatoes are harvested as a cluster of five to nine fruit attached together to a stem. The entire cluster of uniform-sized fruit ripens more uniformly and has more flavor. More recently tomatoes are grown on raised troughs (see picture). This system offers the flexibility of harvesting without bending and also much better air movement around the plant and also better drainage.

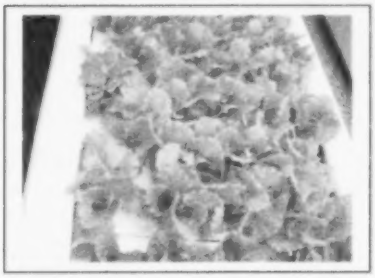
Peppers: Pepper is a more difficult crop to grow. Production takes about 130 days from seed to harvest, The crop is seeded in the middle of October and harvest begins in the middle of March until November. Many growers will bring in 40 days old seedlings from B.C. Because of the time to produce a crop, growers have no income for five months. In addition, the greenhouse structure must have excellent environmental controls because peppers need precise day and night temperature to set flowers and fruit. This means higher investments costs for the construction of a greenhouse to grow peppers. The planting density is between 3.3 to 3.5 plants/m2 (6.5 to 7.1 stems/m2). It takes between 7 to 9 weeks from fruit set to fruit harvest. The yields range between 22 and 26 kg/m2 with potential yields up to 30 kg/m2.



Red fruited varieties make up about 70% of the crop, followed by orange, yellow and purple varieties. All peppers turn green first and then change colors based on their genetics. The demand for hot peppers is slowly growing. At this time it is mostly grown for direct marketing although some is being sold through wholesale channels.

Egg Plants: There is no large scale commercial production of egg plants. Many growers will grow a few rows of egg plants for direct sales. The plant density is like tomatoes. The leaves are very attractive to whiteflies and thrips and biological controls work quite nicely on egg plants. Gradually production is going to increase because of interest from ethnic communities.

Lettuce: Lettuce production is gradually increasing because of more interest in loose leaf and speciality lettuce. It is still not economical to grow crisp lettuce in a greenhouse. Hydroponic systems like NFT (nutrient film technique) or floating raft systems are gaining popularity for lettuce production. It takes about 3-4 weeks from seed to planting of a seedling and another 6-8 weeks to harvest. Crops are planted on a weekly basis. Up to 12 crops per year can be grown. Gross revenue potential for lettuce is around $8/sq.ft. The picture shows leaf lettuce being grown on a floating system where nutrients are supplied from fish waste. The research is being conducted at the Crop Diversification Centre South by Dr. Nick Savidov.



Integrated Pest Management (IPM) is practiced by over 80% of the vegetable growers. and the quality of greenhouse grown vegetables is exceptionally good. Beside wholesaling a large number of growers do sell product directly to consumers and that brings in better revenue. Organic production is practiced by three growers and yields are significantly lower when compared to industry averages. For example a tomato grower reported tomato yields of less than 20 pounds/plant as compared to over 50 pounds/plant. This means that organic growers has to charge higher price for their product. Research protocols for organic production need to be developed as well.

Gross Revenues Potentials: The average gross revenue per year for cucumbers in 2002 was $7.02/sq.foot and for tomatoes it was around $10.16/sq.ft/year. The gross revenue for tomatoes was the highest since 1992 because of higher prices. Tariff on export to US was removed and it helped to bring in better price for greenhouse tomatoes. Peppers average gross revenue was around $8.17/sq.ft. The gross revenue for the vegetable industry is more than $25 million. Operating costs vary with the crops. In 2002 and 2003 the greenhouse fuel costs have increased significantly and will remain the second highest operating cost after labour. Return to equity in case of cucumbers was -$.81, $0.73 in case of tomatoes and $ -0.19 for

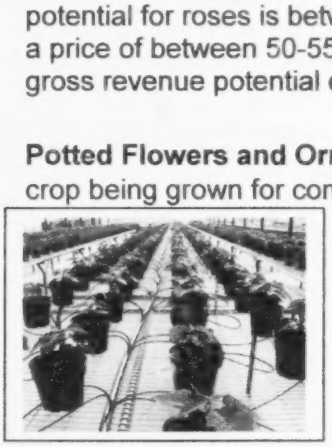
peppers. Return to equity is calculated after deducting the operating and investment costs. Investment costs include operator's labour, interest costs and depreciation. Gross revenue potential depends on total marketable yields and average yearly price. For example during 2002 the price of a 15 lbs case of beef tomatoes was $15.00. This kind of price was not seen in previous years. Tomatoes on vine (TOV) brought in a price of $15.10/5 kg while cherry tomatoes, 4.5 kg were sold for $26.13. Overall yields were over 50 kg/sq.m and that is why the gross revenue was higher for tomatoes. These are industry averages. Some growers with good management practices will have better gross revenue.

At this time, there is some limited production of hot peppers and Chinese vegetables but it is not a significant amount. Production of vegetables for ethnic markets has some potential. There is also an interest in growing leafy vegetables for restaurants for direct sales. These are baby greens which are different types of lettuces, clover, dandelion, pea, purslane and water cress. Because these greens are harvested at 2-4 leaf stage so initial investment is lower and growing them organically is feasible.

Cut Flowers: Cut roses and lilies, including alstroemerias, are the two major crops being grown in Alberta. Chrysanthemums and asters are also grown as cut flowers. There are about 10 acres devoted to the production of cut flowers. Growers are trying other cut flowers like sunflowers, lizianthus and snapdragons. The demand for good quality flowers is continuing to grow. Many growers have their own flower shops so they are able to market much of their crop through this channel with the remainder being sold to the wholesalers.

The industry is seeing new developments in greenhouse design and cultural practices. Roses are grown in soil but since the past 4 years COIR is being increasingly used in troughs above ground. Water recycling is practiced by many cut flower growers. Like vegetable growers greenhouses, these greenhouses are ridge vented and thus are able to maintain better temperature control and levels of carbon dioxide which improves the quality of the cut flowers. Rose production requires the use of artificial lights so initial investment costs will be higher. Gross revenue potential for roses is between $10-12/ft^2 per year based on 20 stems/ft^2 per year and a price of between 50-55 cents/stem. Alstroemeria, Asiatic and oriental lilies have a gross revenue potential of between $8-10/ft^2/year.

Potted Flowers and Ornamentals: Chrysanthemum is the main potted flowering crop being grown for commercial markets. Other potted ornamentals grown include:



poinsettias, geraniums, dahlias, begonias and hanging baskets. High quality poinsettias are grown in Alberta. Rooted cuttings are planted in late July and plants are ready for sale by late November. The trend is to have the crop ready for early November which requires a black-out system to induce the change of color in bracts. The gross revenue potential varies between $6-$ 8/ft^2 based on wholesaling and retailing. Poinsettias are grown from July

to December and the gross revenue is around $2.50/ft^2.

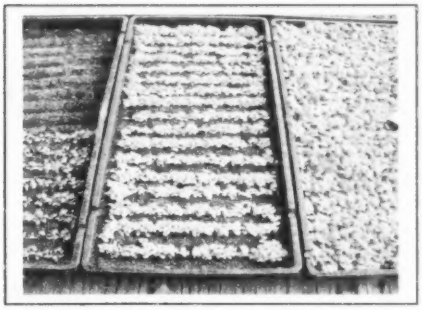
Bedding Plants: Out of 275 acres of greenhouse space in Alberta, approximately 127 acres are devoted to the production of bedding plants. There are more than 300 species of plants produced for bedding out purposes. Geraniums, begonias, New Guinea Impatiens, marigolds, petunias, pansies are among the top 10 species grown.

The trend is for growers to buy plugs instead of seeding the transplants themselves. The plug industry is well established in Alberta with the plugs being grown for sale through the wholesalers.

Most of the bedding plant crop is sold by the end of June although many retail greenhouses are keeping their customers until late August through the sale of hanging baskets. The number of garden centers/greenhouses has steadily increased. Local growers supply a significant amount to large retail chains and this trend is going to continue because we are able to produce high quality plants.

Gross revenue may vary from $6/sq.foot to up to $20/sq.foot based on wholesaling or retailing. Those growers who extend their season by using other flowers, use multiple seeding or grow plugs have the higher gross revenue.

Plug Production: During the past 10 years the production of plugs and rooted material has increased considerably. Two commercial wholesalers buy plant material from local greenhouses and ship across western Canada. Production of good quality plugs requires a greenhouse facility with better environmental controls and excellent skills to manage insects and diseases. Several seeding dates are used to grow these plugs. Rooting of virus indexed geraniums is done in a greenhouse in Alberta. Gross revenue potential is between 12-15 $/sq.foot.



Tree Seedlings: Approximately 50 acres are devoted to the production of tree seedlings. Almost all of the tree seedlings are now grown by the private sector. Over 100 million seedling were produced in 2000. White spruce and lodgepole pine are the two major crops being grown. In 1999 there was a limited production of hybrid poplars and other deciduous material. There are eight growers who are organized under the Alberta Seedling Supply Group. This group purchased the Pine Ridge Nursery at Smoky Lake. It is now called Smoky Lake Forest Nursery.

Tree seedlings are seeded in early January for June or July delivery. It is a challenge to have the seedlings set buds and harden off under May and June light and temperature conditions. These seedlings are planted directly outdoors. Some seeding is done in late February to early March for harvest in November. These seedlings are placed in freezer storage and planted outdoors the following May.

There are different stock types of seedlings grown based on the type of container used for production. In the early nineties, 160 to 190 cavity styroblocks were used which gave a very high density of seedlings. Currently, most of the crop is grown in 112 cavity block. The gross revenue is around $8/sq.ft. Tree seedlings are not grown on speculation, but grown on contract.

Other Materials Grown in Greenhouses: There are a few greenhouses, which are involved in the rooting and production of specialized material from tissue culture. This includes the production of different fruit species such as saskatoon and chokecherry, nursery material and nuclear seed potatoes. Production of tissue culture material has increased in Alberta and has become a specialized business. Capital costs are higher for the construction of greenhouses for rooting of tissue culture material because of the need for bottom heat, flood floors, artificial lights and fogging systems. The gross revenue is considerably higher in such specialized greenhouses when compared to greenhouses producing other plant material.

Research in the production of medicinal plants is increasing. More research is being done on crops such as. Echinacea, calendula, St.John's wort and other herbs. During 2002 season more than one million Echinacea seedlings were grown in greenhouses.

What are some of the trends in the construction of greenhouses?

Computerized environmental controls is the major focus in new greenhouses. The computers monitor and regulate temperature, relative humidity, air movement, condensation, carbon dioxide enrichment, fertilizing and irrigation. The trend is to build taller greenhouses with gutter heights of 18 feet and ridge heights of over 30 feet. The greenhouses utilize ridge venting instead of mechanical ventilation, central inflation of double plastic structures, carbon dioxide recovery from the boiler stacks and recycling of leached water. These innovations are increasing the average cost of construction to more than $\$15/ft^2$.
During 2002-2003 season three tomato greenhouses build structures whereby tomatoes are being grown on raised troughs which are suspended from the gutters. This systems allows the stems to go below the troughs and more light reaches the plants and thus resulting in higher quality and higher yields.

What is the impact of increase in the price of natural gas?

The price of natural gas significantly increased during 2000 and is steadily increasing, and this directly impacted the cost of production. It was estimated that the break even point was around $5.00/Giga Joule and some areas of Alberta were paying up to $13.00 a GJ. The government came up with a FIAP (Farm Income Assistance Program) which was a one time program for $0.40/sq.foot and also a natural gas rebate program was instituted. In 2002 both cucumbers and peppers showed a negative return on equity but tomatoes showed a positive return. This is because of better price/kg of tomatoes. During 2003 season, it appears that the return will be negative for all three vegetables.

Greenhouses consume almost 50% of natural gas during January to March when there is minimum cash flow and thus interest costs on operating money has to be figured out as well in production costs. Bedding plant growers and tree seedling growers will also be negatively impacted. It is becoming increasingly difficult to pass on cost increases to consumers.

Many growers are switching over to coal for heating but the capital costs are higher. Co-generation is being talked about and there are possibilities in this area. Energy conservation is on growers priority list and is practiced by many growers. Use of alternative fuels is being talked about. Realistically speaking growers have to pay close attention to all management practices to increase yields, conserve energy and pay attention to details.

Where is the growth potential?

During the next 10 years, vegetable sector especially in Redcliff-Medicine Hat area is going to invest significantly because of their good infrastructure. Red-Hat Coop is a well established growers cooperative with good market connections. The growth is going to be in the production of peppers and to a limited level in cucumbers and tomatoes. Pik-N-Pak will also expand because of their marketing strengths and infrastructure. The growers has to look for waster heat sources where they can locate new greenhouses.

There will be more resources invested in direct marketing through farmers markets and direct sales to smaller wholesalers. Growers will be diversifying to cater to changing population dynamics.

More growers will be looking for investment in alternative fuels like coal and biomass burning. Technologies are becoming more efficient and environment friendly. Cogeneration and geothermal heating will remain of great interest but due to higher capital costs, the investment will be slower.

Bedding plants area for wholesale marketing is not going to register a huge growth due to serious competition, however, there will be growth in the area of plug

production and marketing. It was mentioned in the survey results that a significant number of growers are buying more plugs so that they do not have to start their greenhouses early, thus saving some energy costs. There will be some growth in perennial production.

No major investments are upcoming in cut flowers area because of cheaper imports, however, growers are going to invest in diversified crops for direct marketing.

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